2015 FIFRA Section 18 Emergency Exemption for Transform® WG Insecticide (sulfoxaflor) to control the newly introduced sugarcane aphid, *Melanaphis sacchari*, in sorghum in Georgia.

Type of Exemption - Georgia Section 18; Specific Exemption Request; January 15, 2015.

This is an application for a specific exemption to authorize the use of Sulfoxaflor (Transform® WG Insecticide EPA Reg. No. 62719-625) to control the newly introduced sugarcane aphid (SCA), *Melanaphis sacchari* in sorghum. The following information is submitted in the format indicated in the proposed rules for Chapter 1, Title 40 CFR, Part 166. This is the second time Georgia Department of Agriculture has applied for this specific exemption. The first exemption in 2014 is referenced as 14GA04.

SECTION 166.20(a)(1): IDENTITY OF CONTACT PERSONS

i. The following are the contact persons responsible for the administration of the emergency exemption:

Name: Eric Olsen
Title: Pesticide Program Manager, Pesticide Programs Division
Organization: Georgia Department of Agriculture
Address: 19 M.L.K. Jr. Drive SW Room 410, Atlanta, GA 30334
Telephone Number: (404) 656-4958
Email: Eric.Olsen@agr.georgia.gov

ii. The following qualified experts are also available to answer questions:

University Representatives:

Name: Dr. G. David Buntin
Title: Professor of Entomology Department:
Entomology Department
Organization: University of Georgia- Griffin Campus
Address: 1109 Experiment Street, Griffin, GA 30223
Telephone Number: (770) 412-4713
E-mail: gbuntin@uga.edu

Name: Dr. Phillip Roberts
Title: Professor of Entomology
Department: Entomology
Organization: University of Georgia - Tifton Campus
Address: Horticulture Building, Room 230, 2360 Rainwater Road, Tifton, GA 31793-5766
Telephone Number: (229) 386-3424
E-mail: proberts@uga.edu

Registrant Representative:

Name: Tami Jones-Jefferson
Title: U.S. Regulatory Leader
U. S. Regulatory & Government Affairs - Crop Protection
Organization: Dow AgroSciences
Address: 9330 Zionsville Road, Indianapolis, IN 46268
Telephone Number: 317.337.3574
E-mail: tjjonesjefferson@dow.com

SECTION 166.20(a)(2): DESCRIPTION OF THE PESTICIDE REQUESTED

i. **Common Chemical Name (Active Ingredient)**: Sulfoxaflor

Brand/Trade Name and EPA Reg. No.: Transform® WG Insecticide, EPA Reg. No. 62719-625

Formulation: Active Ingredient 50%

SECTION 166.20(a)(3): DESCRIPTION OF THE PROPOSED USE

i. Sites to be treated:
Sorghum fields (grain and forage) with the sugarcane aphid, *Melanaphis sacchari*, located statewide are proposed to be treated.

ii. Method of Application:
The proposed method of application will be a foliar application.

iii. Rate of Application:
0.75 – 1.5 oz of Transform® WG per acre (0.023 –0.047 lb ai per acre).

iv. Maximum Number of Applications:
2 applications per year (maximum of 3 oz per acre (0.094 lb ai per acre)

v. Total Acreage to be Treated:
According to the National Agricultural Statistics Service, 40,000 acres of grain sorghum and an additional 10,000 acres of forage sorghum were planted in Georgia in 2014. The acreage planted to sorghum in Georgia for 2015 should not exceed 50,000 acres.

vi. Total Amount of Pesticide to be used:

Based on the previously listed acreage, if an estimated maximum of 50,000 acres of sorghum will be treated at the maximum rate (1.5 oz/acre or 0.047 lb ai/acre) with the maximum number of applications (2 applications or 3.0 oz/acre or 0.094 lb ai/acre), then up to 9,375 pounds of Transform® WG or 4687.5 pounds of active ingredient would be used in 2015.

vii. Restrictions and Requirements:

- Pre-harvest Interval: Do not apply within 14 days of harvest for grain or 7 days of harvest for forage, hay or stover.
- Minimum Treatment Interval: Do not make applications less than 14 days apart.
- Do not make more than two applications per acre per year.
- Do not apply more than a total of 3.0 oz of Transform WG (0.09 lb ai of sulfoxaflor) per acre per year.

viii. Duration of the Proposed Use:

April 1, 2015 through November 30, 2015.

ix. Earliest Possible Harvest Date:

In Georgia sorghum planting dates range, on average, from April 1 – August 1. Harvest dates, on average, ranges from July 1 through November 30.

SECTION 166.20(a)(4): ALTERNATIVE METHODS OF CONTROL

i. Registered Alternative Pesticides:

Seed and At-planting: The neonicotinoid (IRAC 4A) active ingredients - imidacloprid, clothianidin, thiamethoxam, are registered only as seed treatments on sorghum. Trails in others states indicate seed treatments may provide partial suppression of aphids for up to 40 days after planting. (See Appendix figure 1). Terbufos (Counter 20G) is also registered at-panting as an in-furrow application. No data on the efficacy of terbufos is available. It is doubtful these products will provide season-long control.

Foliar organophosate insecticides (IRAC 1B): Registered products include chlorpyrifos, dimethoate, and malathion. Chlorpyrifos (Lorsban 4E, Nufos, others, EPA Reg. No. 62719-220) can be applied at 0.5 to 2.0 pints per acre. Efficacy trials in Georgia and other states show that the 2 pint rate is about 90% effective but applications at this rate have 60 days PHI. At 1 pint per acre chlorpyrifos is 40 – 50% effective and has a 30 day PHI. Dimethoate (EPA Reg. No. 34704-489) at 1 pint per acre has a 28 day PHI and is variable in efficacy ranging from 45-70% for up to 7 days after application. Depending on the product, dimethoate cannot be applied during pollen-shed or cannot be applied after heading. Malathion also is variable in efficacy and generally less than 50% control.

Several pyrethroid active ingredients (IRAC 3A) also are registered including Karate® with Zeon™ Technology (lambda cyhalothrin 22.8%, EPA Reg. No. 100-1097) Lorsban® Advanced, others (Chlorpyrifos 40.2%, EPA Reg. No. 62719-591) Asana® XL (esfenvalerate 8.4%, EPA Reg. No. 352-515). Results in Georgia and other states show that pyrethroids are not effective against SCA and may kill natural enemies causing populations to increase above untreated levels.

Sivanto® (flupyradifurone) was registered for use in January 2015 on various crops including sorghum. In trails in Georgia (Appendix Figures 5 and 6) Sivanto was very effective in controlling SCA. However, at the labeled rates, this product most likely will be too expensive for such a low input crop and may not be economically feasible for most producers. In any event, Transform® is still needed to prevent resistance build up, which is common in aphids.

Azadirachtin (Ecozin, others EPA Reg. No. 5481-559) also is registered for aphid control in sorghum, but was not effective in one trial in Georgia (figure 6).

ii. Alternative Practices:

Aphid resistant varieties of sorghum have been identified by researchers, but sufficient quantities of agronomically acceptable cultivars will not be available for the 2015 planting season. Also, little research has been done on other possible control methods.

SECTION 166.20(a)(5): EFFICACY OF USE PROPOSED UNDER SECTION 18

The SCA has been spreading eastward throughout 2014. It was first found in Marion County GA on 22 August and found in 24 additional counties by the end of the season in 2104 (Appendix, Figures 1 and 2). Three efficacy trials were conducted in Georgia. All trials show that Transform WG at 1.0 or 1.5 oz per acre provided excellent control of *Melanaphis sacchari* for up to 14 days after application (Appendix Figures 4-6). Thiamethoxam (Centric) at 2.5 oz per acre also provided good control in one trial (Appendix, Figure 4). Sivanto was evaluated in 2 trials and provided excellent control at rates of 3, 5, and 7 fl. oz. per acre. Other currently available products, containing the active ingredients – chlorpyrifos and dimethoate provided variable control and usually no greater than 50% control.

Efficacy trials in Texas in 2014 also found that Transform WG provided very good control of SCA on sorghum (Appendix, Tables 1 – 3). Sivanto and centric, which are not currently registered for use on sorghum, also provide very good control of *Melanaphis sacchari*. Other currently available products, containing the active ingredients – chlorpyrifos, dimethoate, and pymetrozine (Fulfill, EPA Reg. No. 100-912) were not effective or provided variable partial control, usually no greater than 50% control.

SECTION 166.20(a)(6): EXPECTED RESIDUES FOR FOOD USES

Acute Assessment

Food consumption information from the USDA 1994-1996 and 1998 Nationwide Continuing Surveys of Food Intake by Individuals (CSFII) and maximum residues from field trials rather than tolerance-level residue estimates were used. It was assumed that 100% of crops covered by the registration request are treated and maximum residue levels from field trials were used.

Drinking water. Two scenarios were modeled, use of sulfoxaflor on non-aquatic row and orchard crops and use of sulfoxaflor on watercress. For the non-aquatic crop scenario, based on the Pesticide Root Zone Model/Exposure Analysis Modeling System (PRZM/EXAMS) and Screening Concentration in Ground Water (SCI-GROW) models, the estimated drinking water concentrations (EDWCs) of sulfoxaflor for acute exposures are 26.4 ppb for surface water and 69.2 ppb for ground water. For chronic exposures, EDWCs are 13.5 ppb for surface water and 69.2 ppb for ground water. For chronic exposures for cancer assessments, EDWCs are 9.3 ppb for surface water and 69.2 ppb for ground water. For the watercress scenario, the EDWCs for surface water are 91.3 ppb after one application, 182.5 ppb after two applications and 273.8 ppb after three applications.

Dietary risk estimates using both sets of EDWCs are below levels of concern. The non-aquatic-crop EDWCs are more representative of the expected exposure profile for the majority of the population. Also, water concentration values are adjusted to take into account the source of the water; the relative amounts of parent sulfoxaflor, X11719474, and X11519540; and the relative liver toxicity of the metabolites as compared to the parent compound.

For acute dietary risk assessment of the general population, the groundwater EDWC is greater than the surface water EDWC and was used in the assessment. The residue profile in groundwater is 60.9 ppb X11719474 and 8.3 ppb X11519540 (totaling 69.2 ppb). Parent sulfoxaflor does not occur in groundwater. The regulatory toxicological endpoint is based on neurotoxicity.

For acute dietary risk assessment of females 13-49, the regulatory endpoint is attributable only to the parent compound; therefore, the surface water EDWC of 9.4 ppb was used for this assessment.

A tolerance of 0.3 ppm for sulfoxaflor on grain sorghum has been established. There is no expectation of residues of sulfoxaflor and its metabolites in animal commodities as a result of the proposed use on sorghum. Thus, animal feeding studies are not needed, and tolerances need not be established for meat, milk, poultry, and eggs.

Drinking water exposures are the driver in the dietary assessment accounting for 100% of the exposures. Exposures through food (sorghum grain and syrup) are zero.

The acute dietary exposure from food and water to sulfoxaflor is 16% of the aPAD for children 1-2 years old and females 13-49 years old, the population groups receiving the greatest exposure.

Chronic Assessment

The same refinements as those used for the acute exposure assessment were used, with two exceptions: (1) average residue levels from crop field trials were used rather than maximum values and (2) average residues from feeding studies, rather than maximum values, were used to derive residue estimates for livestock commodities. It was assumed that 100% of crops are treated and average residue levels from field trials were used.

For chronic dietary risk assessment, the toxicological endpoint is liver effects, for which it is possible to account for the relative toxicities of X11719474 and X11519540 as compared to sulfoxaflor. The groundwater EDWC is greater than the surface water EDWC. The residue profile in groundwater is 60.9 ppb X11719474 and 8.3 ppb X11519540. Adjusting for the relative toxicity results in 18.3 ppb equivalents of X11719474 and 83 ppb X11519540 (totaling 101.3 ppb). The adjusted groundwater EDWC is greater than the surface water EDWC (9.3 ppb) and was used to assess the chronic dietary exposure scenario.

The maximum dietary residue intake via consumption of sorghum commodities would be only a small portion of the RfD (<0.001%) and therefore, should not cause any additional risk to humans via chronic dietary exposure. Consumption of sorghum by sensitive sub-populations such as children and non-nursing infants is essentially zero. Thus, the risk of these subpopulations to chronic dietary exposure to sulfoxaflor used on grain sorghum would be insignificant.

The major contributor to the risk was water (100%). There was no contribution from grain sorghum to the dietary exposure. All other populations under the chronic assessment show risk estimates that are below levels of concern.

Chronic exposure to sulfoxaflor from food and water is 18% of the cPAD for infants, the population group receiving the greatest exposure. There are no residential uses for sulfoxaflor.

Short-term risk. Because there is no short-term residential exposure and chronic dietary exposure has already been assessed, no further assessment of short-term risk is necessary, the chronic dietary risk assessment for evaluating short-term risk for sulfoxaflor is sufficient.

Intermediate-term risk. Intermediate-term risk is assessed based on intermediate-term residential exposure plus chronic dietary exposure. Because there is no residential exposure and chronic dietary exposure has already been assessed, no further assessment of intermediate-term risk is necessary.

Cumulative effects. Sulfoxaflor does not share a common mechanism of toxicity with any other substances, and does not produce a toxic metabolite produced by other substances. Thus, sulfoxaflor does not have a common mechanism of toxicity with other substances.

Cancer. A nonlinear RfD approach is appropriate for assessing cancer risk to sulfoxaflor. This approach will account for all chronic toxicity, including carcinogenicity that could result from exposure to sulfoxaflor. Chronic dietary risk estimates are below levels of concern; therefore, cancer risk is also below levels of concern.

There is a reasonable certainty that no harm will result to the general population, or to infants and children from aggregate exposure to sulfoxaflor as used in this emergency exemption request.

The content in the above Section 166.20(a)(6): "Expected Residues For Food Uses" was prepared by Michael Hare, Ph.D., Texas Department of Agriculture.

SECTION 166.20(a)(7): DISCUSSION OF RISK INFORMATION

Human Health

Toxicological Profile

Sulfoxaflor is a member of a new class of insecticides, the sulfoximines. It is an activator of the nicotinic acetylcholine receptor (nAChR) in insects and, to a lesser degree, mammals. The nervous system and liver are the target organs, resulting in developmental toxicity and hepatotoxicity.

Developmental toxicity was observed in rats only. Sulfoxaflor produced skeletal abnormalities likely resulting from skeletal muscle contraction due to activation of the skeletal muscle nAChR in utero. Contraction of the diaphragm, also related to skeletal muscle nAChR activation, prevented normal breathing in neonates and increased mortality. The skeletal abnormalities occurred at high doses while decreased neonatal survival occurred at slightly lower levels.

Sulfoxaflor and its major metabolites produced liver weight and enzyme changes, and tumors in subchronic, chronic and short-term studies. Hepatotoxicity occurred at lower doses in long-term studies compared to short-term studies.

Reproductive effects included an increase in Leydig cell tumors which were not treatment related due to the lack of dose response, the lack of statistical significance for the combined tumors, and the high background rates for this tumor type in F344 rats. The primary effects on male reproductive organs are secondary to the loss of normal testicular function due to the size of the Leydig Cell adenomas. The secondary effects to the male reproductive organs are also not treatment related. It appears that rats are uniquely sensitive to these developmental effects and are unlikely to be relevant to humans.

Clinical indications of neurotoxicity were observed at the highest dose tested in the acute neurotoxicity study in rats. Decreased motor activity was also observed in the mid- and high-dose groups. Since the neurotoxicity was observed only at a very high dose and many of the effects are not consistent with the perturbation of the nicotinic receptor system, it is unlikely that these effects are due to activation of the nAChR.

Tumors have been observed in rat and mouse studies. In rats, there were significant increases in hepatocellular adenomas in the high-dose males. In mice, there were significant increases in hepatocellular adenomas and carcinomas in high dose males. In female mice, there was an increase in carcinomas at the high dose. Liver tumors in mice were treatment-related. Leydig cell tumors were also observed in the high-dose group of male rats, but were not related to treatment. There was also a significant increase in preputial gland tumors in male rats in the high-dose group. Given that the liver tumors are produced by a non-linear mechanism, the Leydig cell tumors were not treatment-related, and the preputial gland tumors only occurred at the high dose in one sex of one species, the evidence of carcinogenicity was weak.

Ecological Toxicity

Sulfoxaflor (N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-lambda 4-sulfanylidene]) is a new variety of insecticide as a member of the sulfoxamine subclass of neonicotinoid insecticides. It is considered an agonist of the nicotinic acetylcholine receptor and exhibits excitatory responses including tremors, followed by paralysis and mortality in target insects. Sulfoxaflor consists of two diastereomers in a ratio of approximately 50:50 with each diastereomer consisting of two enantiomers. Sulfoxaflor is systemically distributed in plants when applied. The chemical acts through both contact action and ingestion and provides both rapid knockdown (symptoms are typically observed within 1-2 hours of application) and residual control (generally provides from 7 to 21 days of residual control). Incident reports submitted to EPA since approximately 1994 have been tracked via the Incident Data System. Over the 2012 growing season, a Section 18 emergency use was granted for application of sulfoxaflor to cotton in four states (MS, LA, AR, TN). No incident reports have been received in association with the use of sulfoxaflor in this situation.

Sulfoxaflor is classified as practically non-toxic on an acute exposure basis, with 96-h LC_{50} values of >400 mg a.i./L for all three freshwater fish species tested (bluegill, rainbow trout, and common carp). Mortality was 5% or less at the highest test treatments in each of these studies. Treatment-related sublethal effects included discoloration at the highest treatment concentration (100% of fish at 400 mg a.i./L for bluegill) and fish swimming on the bottom (1 fish at 400 mg a.i./L for rainbow trout). No other treatment-related sublethal effects were reported. For an estuarine/marine sheepshead minnow, sulfoxaflor was also practically non-toxic with an LC_{50} of 288 mg a.i./L. Sublethal effects included loss of equilibrium or lying on the bottom of aquaria at 200 and 400 mg a.i./L. The primary degradate of sulfoxaflor is also classified as practically non-toxic to rainbow trout on an acute exposure basis (96-h LC_{50} >500 mg a.i./L).

Adverse effects from chronic exposure to sulfoxaflor were examined with two fish species (fathead minnow and sheepshead minnow) during early life stage toxicity tests. For fathead minnow, the 30-d NOAEC is 5 mg a.i./L based on a 30% reduction in mean fish weight relative to controls at the next highest concentration (LOAEC=10 mg a.i./L). No statistically significant and/or treatment-related effects were reported for hatching success, fry survival and length. For sheepshead minnow, the 30-d NOAEC is 1.3 mg a.i./L based on a statistically significant reduction in mean length (3% relative to controls) at 2.5 mg a.i./L. No statistically significant and/or treatment-related effects were reported for hatching success, fry survival and mean weight.

The acute toxicity of sulfoxaflor was evaluated for one freshwater invertebrate species, the water flea and two saltwater species (mysid shrimp and Eastern oyster). For the water flea, the 48-h EC_{50} is >400 mg a.i./L, the highest concentration tested. For Eastern oyster, new shell growth was significantly reduced at 120 mg a.i./L (75% reduction relative to control). The 96-h EC_{50} for shell growth is 93 mg a.i./L. No mortality occurred at any test concentration. Mysid shrimp are the most acutely sensitive invertebrate species tested with sulfoxaflor based on water column only exposures, with a 96-h LC_{50} of 0.67 mg a.i./L. The primary degradate of sulfoxaflor is also classified as practically non-toxic to the water flea (EC_{50} >240 mg a.i./L).

The chronic effects of sulfoxaflor to the water flea were determined in a semi-static system over a period of 21 days to nominal concentrations of 6.25, 12.5, 25, 50 and 100 mg a.i./L. Adult mortality, reproduction rate (number of young), length of the surviving adults, and days to first brood were used to determine the toxicity endpoints. No treatment-related effects on adult mortality or adult length were observed. The reproduction rate and days to first brood were significantly ($p<0.05$) different in the 100 mg a.i./L test group (40% reduction in mean number of offspring; 35% increase in time to first brood). No significant effects were observed on survival, growth or reproduction at the lower test concentrations. The 21-day NOAEC and LOAEC were determined to be 50 and 100 mg a.i./L, respectively.

The chronic effects of sulfoxaflor to mysid shrimp were determined in a flow-through system over a period of 28 days to nominal concentrations of 0.063, 0.13, 0.25, 0.50 and 1.0 mg a.i./L. Mortality of parent (F_0) and first generation (F_1), reproduction rate of F_0 (number of young), length of the surviving F_0 and F_1, and days to first brood by F_0 were used to determine the toxicity endpoints. Complete F_0 mortality (100%) was observed at the highest test concentration of 1.0 mg a.i./L within 7 days; no treatment-related effects on F_0/F_1 mortality, F_0 reproduction rate, or F_0/F_1 length were observed at the lower test concentrations. The 28-day NOAEC and LOAEC were determined to be 0.11 mg and 0.25 mg a.i./L, respectively.

Sulfoxaflor exhibited relatively low toxicity to aquatic non-vascular plants. The most sensitive aquatic nonvascular plant is the freshwater diatom with a 96-h EC_{50} of 81.2 mg a.i./L. Similarly, sulfoxaflor was not toxic to the freshwater vascular aquatic plant, *Lemna gibba*, up to the limit amount, as indicated by a 7-d EC_{50} for frond count, dry weight and growth rate of >100 mg a.i./L with no significant adverse effects on these endpoints observed at any treatment concentration.

Based on an acute oral LD_{50} of 676 mg a.i./kg bw for bobwhite quail, sulfoxaflor is considered slightly toxic to birds on an acute oral exposure basis. On a subacute, dietary exposure basis, sulfoxaflor is classified as practically nontoxic to birds, with 5-d LC_{50} values of >5620 mg/kg-diet for mallard ducks and bobwhite quail. The NOAEL from these studies is 5620 mg/kg-diet as no treatment related mortality of sublethal effects were observed at any treatment. Similarly, the primary degradate is classified as practically nontoxic to birds on an acute oral exposure basis with a LD_{50} of >2250 mg a.i./kg bw. In two chronic, avian reproductive toxicity studies, the 20-week NOAELs ranged from 200 mg/kg-diet (mallard, highest concentration tested) to 1000 mg/kg-diet (bobwhite quail, highest concentration tested). No treatment-related adverse effects were observed at any test treatment in these studies.

For bees, sulfoxaflor is classified as very highly toxic with acute oral and contact LD_{50} values of 0.05 and 0.13 µg a.i./bee, respectively, for adult honey bees. For larvae, a 7-d oral LD_{50} of >0.2 µg a.i./bee was determined (45% mortality occurred at the highest treatment of 0.2 µg a.i./bee). The primary metabolite of sulfoxaflor is practically non-toxic to the honey bee. This lack of toxicity is consistent with the cyano-substituted neonicotinoids where similar cleavage of the cyanide group appears to eliminate their insecticidal activity. The acute oral toxicity of sulfoxaflor to adult bumble bees (*Bombus terrestris*) is similar to the honey bee; whereas its acute contact toxicity is about 20X less toxic for the bumble bee. Sulfoxaflor did not demonstrate substantial residual toxicity to honey bees exposed via treated and aged alfalfa (i.e., mortality was <15% at maximum application rates).

At the application rates used (3-67% of US maximum), the direct effects of sulfoxaflor on adult forager bee mortality, flight activity and the occurrence of behavioral abnormalities is relatively short-lived, lasting 3 days or less. Direct effects are considered those that result directly from interception of spray droplets or dermal contact with foliar residues. The direct effect of sulfoxaflor on these measures at the maximum application rate in the US is presently not known. When compared to control hives, the effect of sulfoxaflor on honey bee colony strength when applied at 3-32% of the US maximum proposed rate was not apparent in most cases. When compared to hives prior to pesticide application, sulfoxaflor applied to cotton foliage up to the maximum rate proposed in the US resulted in no discernible decline in mean colony strength by 17 days after the first application. Longer-term results were not available from this study nor were concurrent controls included. For managed bees, the primary exposure routes of concern include direct contact with spray droplets, dermal contact with foliar residues, and ingestion through consumption of contaminated pollen, nectar and associated processed food provisions. Exposure of hive bees via contaminated wax is also possible. Exposure of bees through contaminated drinking water is not expected to be nearly as important as exposure through direct contact or pollen and nectar.

In summary, sulfoxaflor is slightly toxic to practically non-toxic to fish and freshwater water aquatic invertebrates on an acute exposure basis. It is also practically non-toxic to aquatic plants (vascular and non-vascular). Sulfoxaflor is highly toxic to saltwater invertebrates on an acute exposure basis. The high toxicity of sulfoxaflor to mysid shrimp and benthic aquatic insects relative to the water flea is consistent with the toxicity profile of other insecticides with similar MOAs. For birds and mammals, sulfoxaflor is classified as moderately toxic to practically non-toxic on an acute exposure basis. The threshold for chronic toxicity (NOAEL) to birds is 200 ppm and that for mammals is 100 ppm in the diet. Sulfoxaflor did not exhibit deleterious effects to terrestrial plants at or above its proposed maximum application rates.

For bees, sulfoxaflor is classified as very highly toxic. However, if this insecticide is strictly used as directed on the Section 18 supplemental label, no significant adverse effects are expected to Louisiana wildlife. Of course, standard precautions to avoid drift and runoff to waterways of the state are warranted. As stated on the Section 3 label, risk to managed bees and native pollinators from contact with pesticide spray or residues can be minimized when applications are made before 7 am or after 7 pm or when the temperature is below 55°F at the site of application.

Environmental Fate

Sulfoxaflor is a systemic insecticide which displays translaminar movement when applied to foliage. Movement of sulfoxaflor within the plant follows the direction of water transport within the plant (i.e., xylem mobile) as indicated by phosphor translocation studies in several plants. Sulfoxaflor is characterized by a water solubility ranging from 550 to 1,380 ppm. Sulfoxaflor has a low potential for volatilization from dry and wet surfaces (vapor pressure= 1.9×10^{-8} torr and Henry's Law constant= 1.2×10^{-11} atm m^3 $mole^{-1}$, respectively at 25 °C). Partitioning coefficient of sulfoxaflor from octanol to water (K_{ow} @ 20 C & pH 7= 6; Log K_{ow} = 0.802) suggests low potential for bioaccumulation. No fish bioconcentration study was provided due to the low K_{ow}, but sulfoxaflor is not expected to bioaccumulate in aquatic systems. Furthermore, sulfoxaflor is not expected to partition into the sediment due to low K_{oc} (7-74 mL/g).

Registrants tests indicate that hydrolysis, and both aqueous and soil photolysis are not expected to be important in sulfoxaflor dissipation in the natural environment. In a hydrolysis study, the parent was shown to be stable in acidic/neutral/alkaline sterilized aqueous buffered solutions (pH values of 5, 7 and 9). In addition, parent chemical as well as its major degradate, were shown to degrade relatively slowly by aqueous photolysis in sterile and natural pond water ($t^{½}$= 261 to >1,000 days). Furthermore, sulfoxaflor was stable to photolysis on soil surfaces. Sulfoxaflor is expected to biodegrade rapidly in aerobic soil (half-lives <1 day). Under aerobic aquatic conditions, biodegradation proceeded at a more moderate rate with half-lives ranging from 37 to 88 days. Under anaerobic soil conditions, the parent compound was metabolized with half-lives of 113 to 120 days while under anaerobic aquatic conditions the chemical was more persistent with half-lives of 103 to 382 days. In contrast to its short-lived parent, the major degradate is expected to be more persistent than its parent in aerobic/anaerobic aquatic systems and some aerobic soils. In other soils, less persistence is expected due to mineralization to CO_2 or the formation of other minor degradates.

In field studies, sulfoxaflor has shown similar vulnerability to aerobic bio-degradation in nine out of ten terrestrial field dissipation studies on bare-ground/cropped plots (half-lives were <2 days in nine cropped/bare soils in CA, FL, ND, ON and TX and was 8 days in one bare ground soil in TX). The chemical can be characterized by very high to high mobility (Kf_{oc} ranged from 11-72 mL g^{-1}). Rapid soil degradation is expected to limit chemical amounts that may potentially leach and contaminate ground water. Contamination of groundwater by sulfoxaflor will only be expected when excessive rain occurs within a short period (few days) of multiple applications in vulnerable sandy soils. Contamination of surface water by sulfoxaflor is expected to be mainly related to drift and very little due to run-off. This is because drifted sulfoxaflor that reaches aquatic systems is expected to persist while that reaching the soil system is expected to degrade quickly with slight chance for it to run-off.

When sulfoxaflor is applied foliarly on growing crops it is intercepted by the crop canopy. Data presented above appear to indicate that sulfoxaflor enters the plant and is incorporated in the plant foliage with only limited degradation. It appears that this is the main source of the insecticide sulfoxaflor that would kill sap sucking insects. This is because washed-off sulfoxaflor, that reaches the soil system, is expected to degrade.

In summary, sulfoxaflor has a low potential for volatilization from dry and wet surfaces. This chemical is characterized by a relatively higher water solubility. Partitioning coefficient of sulfoxaflor from octanol to water suggests low potential for bioaccumulation in aquatic organisms such as fish. Sulfoxaflor is resistant to hydrolysis and photolysis but transforms quickly in soils. In contrast, sulfoxaflor reaching aquatic systems by drift is expected to degrade rather slowly. Partitioning of sulfoxaflor to air is not expected to be important due to the low vapor pressure and Henry’s Law constant for sulfoxaflor. Exposure in surface water results from the drifted parent compound, and only minor amounts are expected to run-off only when rainfall and/or irrigation immediately follow application. The use of this insecticide is not expected to adversely impact Louisiana ecosystems when used according to the Section 18 label. Of course, caution is needed to prevent exposure to water systems because of toxicity issues to aquatic invertebrates. As stated on the Section 3 label, this product should never be applied directly to water, to areas where surface water is present or to intertidal areas below the mean water mark. Also, the label includes the statement “Do not contaminate water when disposing of equipment rinsate.”

Endangered and Threatened Species in Georgia

No impacts are expected on endangered and threatened species by this very limited use of this insecticide as delineated in the Section 18 application. Sulfoxaflor demonstrates a very favorable ecotoxicity and fate profile as stated above and should not directly impact any protected mammal, fish, avian, or plant species. This product does adversely affect insects and aquatic invertebrates, especially bees, but the limited exposure to these species should not negatively affect endangered and threatened species when applications follow the label precautions.

The above content in Section 166.20(a)(7): Discussion of Risk Information was, for the most part, prepared by Michael Hare, Ph.D. (Human Health Effects), David Villarreal, Ph.D. (Ecological Effects), and David Villarreal, Ph.D. (Environmental Fate), all with the Texas Department of Agriculture. The parts of the above content in this section, with references to Louisiana, were prepared by Louisiana Department of Agriculture and Forestry.

SECTION 166.20(a)(8): COORDINATION WITH OTHER AFFECTED STATE OR FEDERAL AGENCIES

The following state/federal agencies were notified of the Georgia Department of Agriculture actions to submit an application for a specific exemption to EPA:

- Georgia Department of Environmental Quality Water Quality
- Georgia Department of Natural resources (GDNR)
- U.S. Fish and Wildlife Department

Responses from these agencies will be forwarded to EPA immediately if and when received by GDA.

SECTION 166.20(a)(9): ACKNOWLEDGEMENT BY THE REGISTRANT

Dow AgroScience has been notified of this agency’s intent regarding this application and have offered a letter of support (Attachment). They have also provided a copy of the proposed Section 18 label with the use directions for this use (although this use is dependent upon approval by EPA).

SECTION 166.20(a)(10): DESCRIPTION OF PROPOSED ENFORCEMENT PROGRAM

Georgia Department of Agriculture has state statutory authority to regulate the distribution, storage, sale, use and disposal of pesticides in the state of Georgia. GDA will ensure proper use of the product and accurate reporting of the use information.

A final report will be submitted to EPA after the 2014 growing season for which the Section 18 specific exemption is requested. Field enforcement staff at GDA, as appropriate, will monitor sales of Transform® WG Insecticide, make use observations, and respond to misuse complaints.

SECTION 166.20(a)(11): REPEAT USES

This is the second time Georgia Department of Agriculture has applied for this specific exemption. The first exemption in 2014 is references as 14GA04.

SECTION 166.20(b)(1): NAME OF THE PEST

Melanaphis sacchari. known as the sugarcane aphid.

SECTION 166.20(b)(2): DISCUSSION OF EVENTS OR CIRCUMSTANCES WHICH BROUGHT ABOUT THE EMERGENCY SITUATION

The events and/or circumstances which brought about the emergency situation are difficult to pinpoint. In the fall of 2013, unusually high populations of aphids were discovered near Beaumont, Texas, by Dr. Mo Way, Texas A&M University. The aphid was soon detected along the Texas Gulf Coast and the Texas Lower Rio Grande Valley and soon spread to Louisiana, Mississippi and Oklahoma. The lack of efficacious products for control of SCA allowed the 2013 infestations in sorghum in other states to grow unimpeded. Since it's outbreak in grain sorghum fields, the aphid was identified taxonomically by Dr. Susan Halbert (Florida Dept. of Agriculture and Consumer Services, Div. Plant Industry) a recognized expert in aphid taxonomy and other homopteran taxonomist as the sugarcane aphid, *Melanaphis sacchari*. (Report of identification attached in the appendix).

SCA was originally reported as an exotic species on sugarcane in 1977 in Florida and later in 1999 in Louisiana but was not known to infest sorghum. The aphid has been present in Hawaii on sugarcane since the late 1800s. New research by Nibouche et al. (2014, PLOS One 9(8): e106067) on the genetic structure of *M. sacchari* indicates that the introductions in Florida and LA were from Hawaii. Furthermore, populations in Hawaii from sugarcane and LA from sugarcane and sorghum represent a single lineage which is distinct from linages in other parts of the world. The events and/or circumstances brought about the infestation of this aphid on sorghum are not fully known. It is possible the aphid shifted its host from sugarcane to sorghum. This shift is not a large move because sugarcane and sorghum belong to the same family of grasses, Poaceae, and the genus's of Saccharum and Sorghum are closely related. The factors which brought about this shift most surely include certain weather conditions (hot, cold, wet, dry) and cropping schemes (acres planted to sugarcane, sorghum, corn, etc.). It is also possible SCA on sorghum represents a new introduction of a different strain of *Melanaphis sacchari*, but the work by Nibouche et al. (2014) indicates that populations from sugarcane and sorghum in LA are the same genetic lineage.

In 2014 the aphid rapidly spread to 10 southern states including GA (see maps in Appendix). Eight states received Section 18 exemptions for the use of sulfoxaflor in sorghum in 2014. Since widespread detection in South Texas and Louisiana in 2013, a Sugarcane Aphid Task Force was formed to effectively communicate and address this pest issue. The Texas A&M AgriLife Extension Service publication ENTO-035: 2/14 titled "Sugarcane Aphid: A New Pest of Sorghum" was published (Attachment). This publication provides information on the current situation.

Studies in South Texas indicate that SCA does not lay eggs, they are viviparous (give birth to live young). During the winter months, temperatures in the South Texas only reach a minimum of around 28ºF. During normal cold spells, the daytime temperature rises above 40ºF, which does not hinder the SCA, as they can seek shelter in the abundance of volunteer sorghum and johnsongrass. This provides a source population as sorghum acreage is planted in February in March in the southernmost areas of Texas. With the last harvest date of late November/early December in some areas, the population has a large timeframe to establish itself. The South Texas area provides an optimal environment for the SCA to overwinter. The populations of SCA begin feeding on the lower leaves of sorghum plants then rapidly advance to the upper leaves and even colonize in the sorghum head. The aphid rapidly also spread northward into Oklahoma, Kansas and Tennessee in 2014.

A similar situation most likely will occur in the southeastern U.S. with the aphid overwintering in Florida and possibly southern Georgia and the likely rapid spread of the aphid northward in 2015. We expect aphid infestations in commercial sorghum fields to occur much earlier in the season in Georgia in 2015 than 2014 and to be a potentially damaging sorghum pest throughout the season.

SECTION 166.20(b)(3): DISCUSSION OF ANTICIPATED RISKS TO ENDANGERED OR THREATENED SPECIES, BENIFICIAL ORGANISMS, OR THE ENVIRONMENT REMEDIED BY THE PROPOSED USE

Since the efficacy of the insecticides currently registered for the control of aphids on sorghum is poor, growers will be forced to use the maximum rates and may 'over-apply' to gain control. The utilization of high application rates can negatively impact beneficial insects and other organisms, possibly exasperating SCA infestations and spurring outbreaks of secondary pests. However, sulfoxaflor is less harmful to natural enemies than the organophosphate insecticides that is will replace. Also, these higher use rates have the potential to negatively impact non- target organisms due to off-target movement.

It is not anticipated that there should be any anticipated risks to endangered or threatened species, beneficial organisms or the environment if the application is made according to the section 18 use directions.

SECTION 166.20(b)(4): DISCUSSION OF SIGNIFICANT ECONOMIC LOSS

According to the National Agricultural Statistics Service grain sorghum produced on 40,000 acres had a total value of $10,300,000 in the Georgia in 2013. NASS also reported that 100,000 tons of forage sorghum was produced in 2013. A total value was not reported but assuming $50 per wet ton, forage sorghum was worth about $5,000,000 in 2013. 2014 data are not available.

Because the SCA has only been present in Georgia for a short time, no data on economic impact is available. Five insecticide efficacy trials were conducted in Georgia in 1014. Results of 3 trials are reported in the Appendix. In all trials sorghum stands were not consistent or plants died after aphid evaluations but before yield could be measured. County agents in Georgia indicate that about 29,955 acre of sorghum was infested by SCA in 2014 and that nearly every acre was treated at least once with and insecticide mainly Transform, chlorpyrifos or dimethoate (see table below). Entomologist in other state also report 20 - 50 % yield reductions. In a survey of Louisiana sorghum growers in 2014, individual crop damage due to SCA infestations (grower estimates) varied widely from 5% to 100% yield loss in infested fields. Similar levels of yield loss and harvest interference by SCA to sorghum most likely occurred in Georgia. Furthermore honeydew from aphids and sooty mold interferes with the efficacy of desiccant harvest aids. Large numbers of aphids and honeydew at harvest time also have been found to damage combine harvest equipment.

Research in 2014 by Drs. Mike Brewer, Texas A&M AgriLife Research and David Kerns, Louisiana State University Ag Center at sites in southern Texas and northern Louisiana on the effect of SCA feeding injury on sorghum yield loss found sorghum yield decline in a linear manner as SCA infestation level increased. They found that yield declined an average of 3.325 bushels per acre for every 100 aphids per leaf (see Appendix figure 7). Based on this research, treatment thresholds of 60 -120 aphids per leaf have been calculated. For project prices of sorghum in 2105 of $3.80 per bushel, a treatment threshold of 100 aphids per leaf is appropriate.

University of Georgia crop budgets estimates for 2015 (http://www.agecon.uga.edu/extension/budgets/grain-sorghum/index.html) expect a price of about $7.50 per CWT or about $3.80 per bushel. For dryland sorghum, yield is estimated to be 65 bu /acre and total variable costs at $223 per acre with a return above variable costs of $24/acre. If fixed costs are included total cost are $298 per acre and return land and management is estimates to be -$55. The relatively slim profit margin means unexpected and uncontrolled pest infestations, like the sugarcane aphid, can have a devastating impact on the profitability of the crop.

Resistance Management Plan and Management Recommendations.

The aphid does not overwinter in areas with consistent freezing temperatures. However, the precise area of overwintering is not clearly defined. The aphid was found during the winter in southern Texas in 2013/2014 along the gulf coast. Presumably it can survive the winter in central Florida and possibly in northern Florida and southern Georgia. Most likely the aphid will appear and spread in sorghum fields in Georgia much earlier in the 2015 than the 2014 season and be present throughout the 2015 growing season.

At-planting: Research trials in Louisiana show the imidacloprid, thiamethoxam and clothianidin when applied as a seedling treatment can provide up to 40 days of suppression of the aphid (see Appendix figure 3). So seed treatments will be recommended. These products are neonicotinoid insecticides (IRAC 4A) and have a different mode of action than sulfoxaflor.

Plant resistant sorghum lines and varieties have been documented. A screening of the 2014 Georgia grain sorghum variety found that three hybrids (varieties) had reduced infestations of sugarcane aphid than other varieties (http://www.caes.uga.edu/commodities/swvt/2014/sysr14/AP103-6-contents.html). It is premature to recommend these lines as being resistant until more trials can be conducted in 2015 to verify the resistance. The effects if any of planting date, tillage practices or other cultural control methods are not known at this time.

In-season Management: Growers and consultant will be expected to sample fields for sugarcane aphid. A rapid inspection of present and absent will determine if the aphid is present. Once found in a field sampling by counting aphids on 10 leaves in 10 spots within a field will provide a useful measure of infestation. Economic thresholds for the aphid are still not known in detail but trials by Michael Brewer (Texas A&M University and David Kerns (LSU AgCenter) show that infestations of 50 – 125 aphids per leaf can reduce grain yield. They calculate an average yield loss of 3.25 bu/acre per 100 aphids per leaf. They further calculated economic treatment thresholds of 60 – 120 aphids per leaf depending on sorghum commodity price and application costs. A general threshold of 100 aphids per leaf will be used in 2015 until further studies can refine this level.

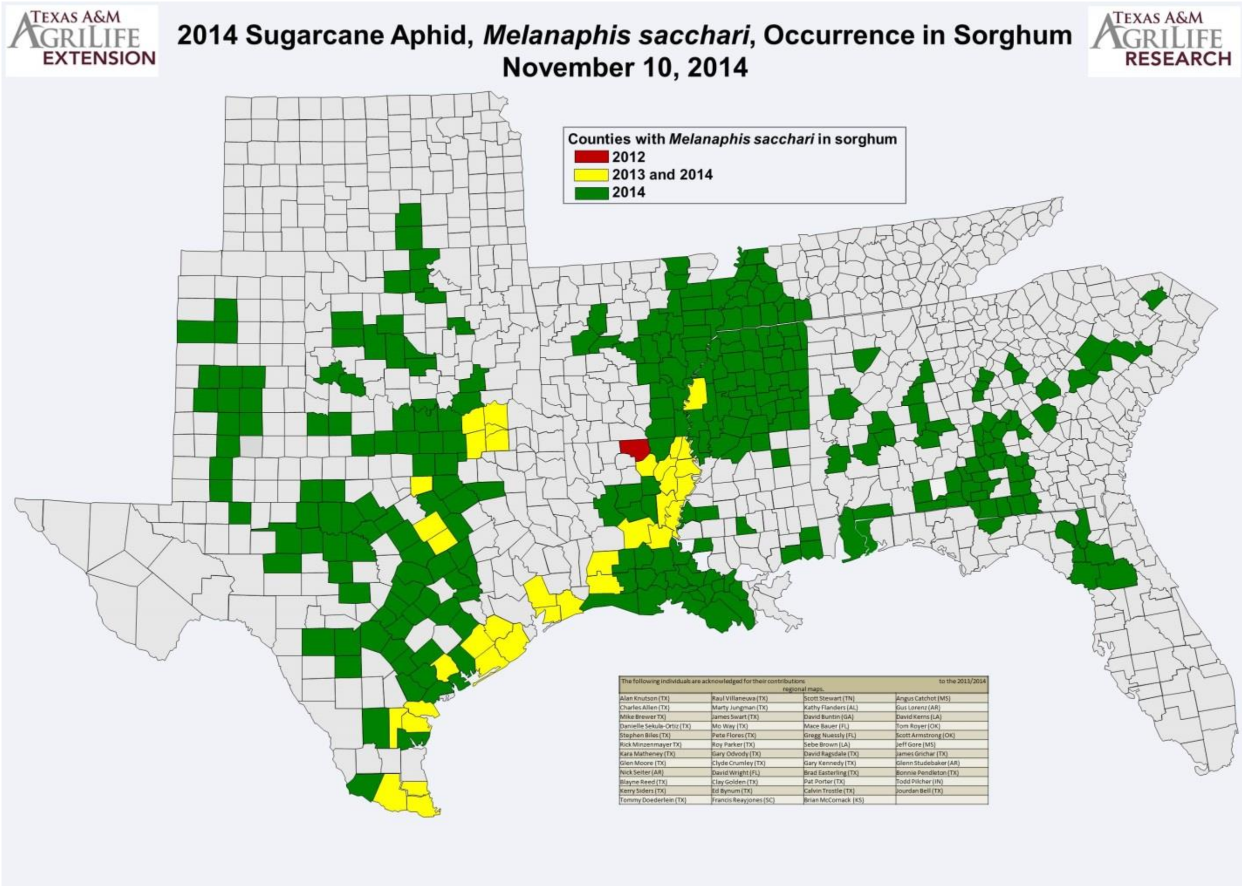
In 2014 infestations in Georgia, it was observed that aphids attract large numbers of natural enemies including lady beetles, syrphid fly larvae, and lacewings. The effect of natural enemies in not fully known but if an infestation is near the economic threshold and large numbers of natural enemies are present, a grower can wait and see if aphid numbers increase by the next sample time.

Applications of pyrethroid insecticides will kill natural enemies and flare the aphid and should be avoided. Pyrethroid insecticides are used to control occasional infestations of fall armyworm in the whorl and for corn earworms in the grain head. Belt (flubediamide, IRAC 28) is a useful selective alternative for lepidopteran worm control. Pyrethroid insecticides are also used during flowering to control sorghum midge. The only non-pyrethroid alternative for sorghum midge is chlorpyrifos at 0.5 pints per acre. Dimethoate also would be effective if a formulation without a restriction after heading can be found.

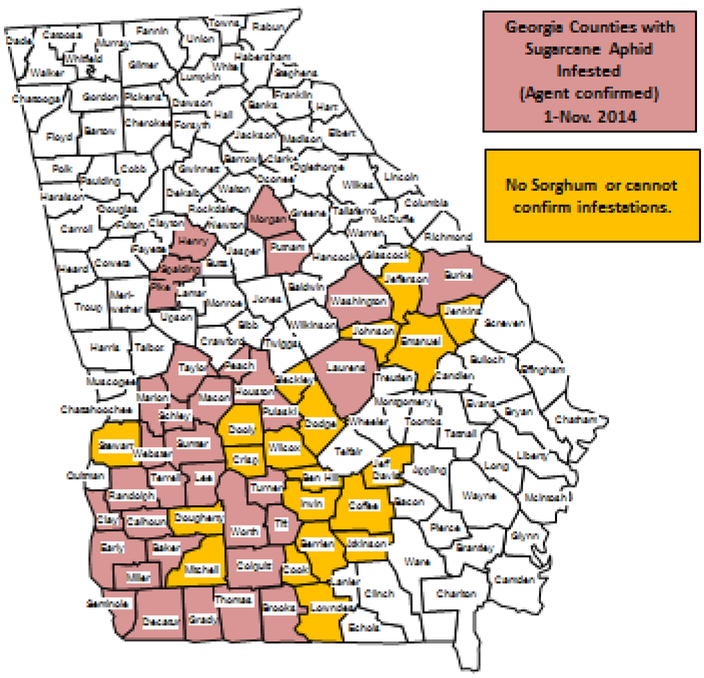
Foliar Insecticide options for sugarcane aphid:

- The 2015 Section 18 request for sulfoxaflor (Transform WG) has a limit of 2 applications per season. This will limit the selective pressure for resistance to Transform by sugarcane aphid. Transform also should not be used in consecutive applications.
- In pre-heading whorl-stage sorghum, applications of chlorpyrifos at 2 pints per acre (PHI 60 days), or chlorpyrifos + dimethoate each at 1 pint per acre (PHI 30 and 28 days respectively) can be used. Both are IRAC 1B. Label of most dimethoate products prohibit application during bloom or after heading which limits its use to whorl stage sorghum.
- During heading and grain fill, Transform WG (IRAC 4C) can be used twice to control the aphid. Chlorpyrifos at 1 pint per acre is not highly effective and has a 30 day PHI. There are no other registered and effective insecticide options for the period during grain fill.
- Sivanto (flupyradifurone, IRAC 4D) was registered for use on various crops including sorghum in January 2015. Sivanto is effective against sugarcane aphid but the labeled rates are too high to be cost effective for sorghum production. The registrant is planning on requesting a 2ee label for reduce rates of Sivanto for sorghum. If approved Sivanto is a distinct mode of action and can be rotated with Transform for sugarcane aphid control.
- Another insecticide with a different mode of action such as thiamethoxam (Centric 40WG, IRAC 4A) would be a useful IRM tool for sugarcane aphid. Trials in 2014 showed that Centric was very effective at 2.5 oz per acre but it is not labeled for foliar applications on sorghum. Thiamethoxam and sulfoxaflor are reported to have different modes of action.
- Harvest: Timely harvest of sorghum should be encouraged. If a large infestation of sugarcane aphid is present and may interfere with harvest equipment, Transform WG can be used up to 14 days before harvest. Malathion (IRAC 1B) also is labeled and used up to 3 days before grain harvest. At the maximum use rate malathion is only partly effective and may suppress infestations.

APPENDIX



Figures 1 and 2: Distribution of *Melanaphis sacchari* in the southern U.S. (top figure as of November 10, 2014). Bottom: Counties reporting *M. sacchari* in commercial grain or forage sorghum fields in Georgia as of 1 November, 2014.



Insecticide Efficacy Data

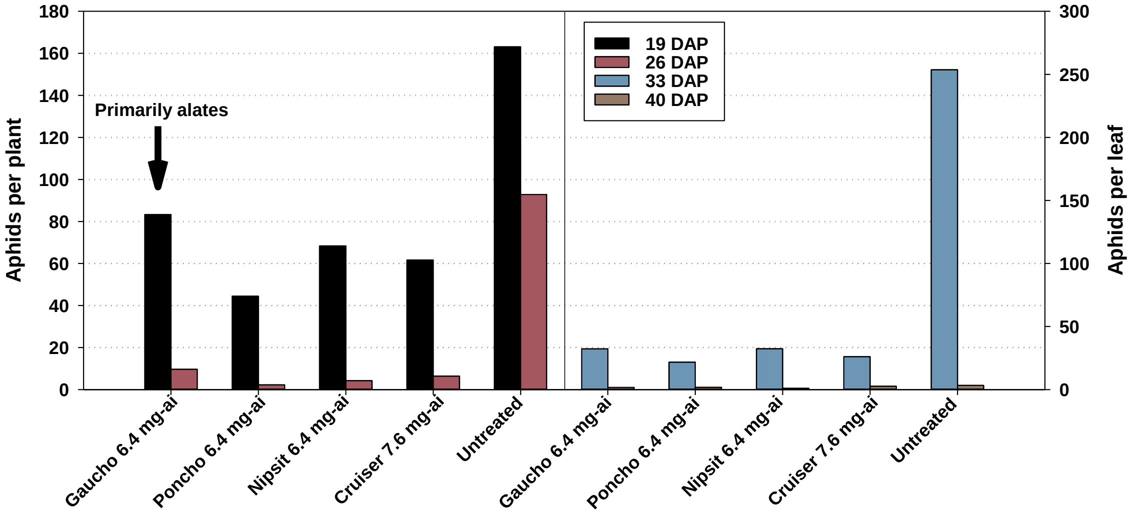


Figure 3. Impact of seed treatments on SCA population development.
Source: David Kerns, Louisiana State University AgCenter, 2014.

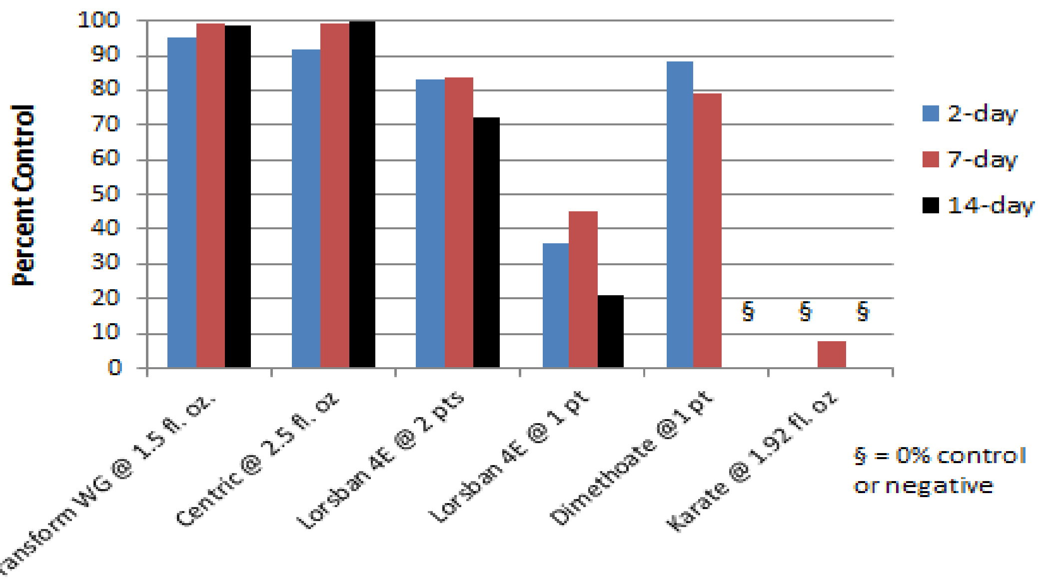


Figure 4. Insecticide Control of Sugarcane Aphid Control on Grain Sorghum, Marion County, GA 2014, treatments applied August 26, 2014 at anthisis.

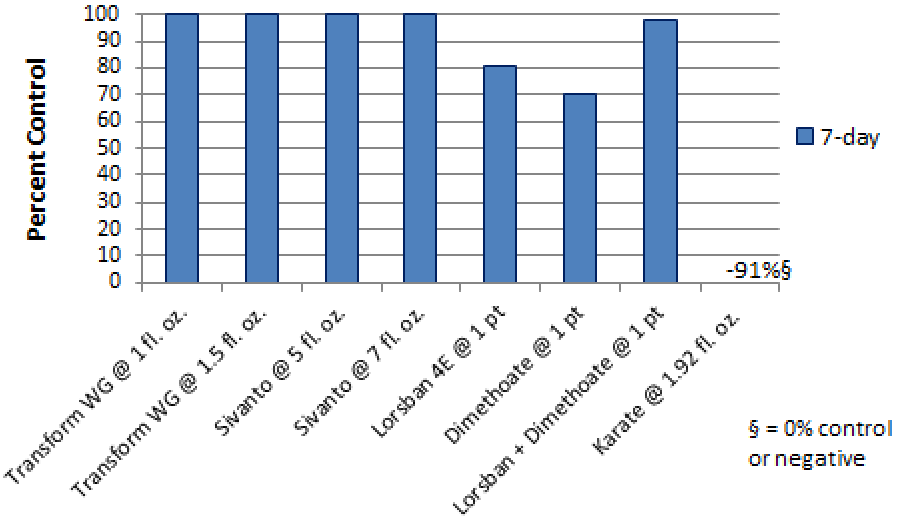


Figure 5. Insecticide Control of Sugarcane Aphid Control on Grain Sorghum, Colquitt County, GA 2014, treatments applied September 5, 2014 at early grain fill.

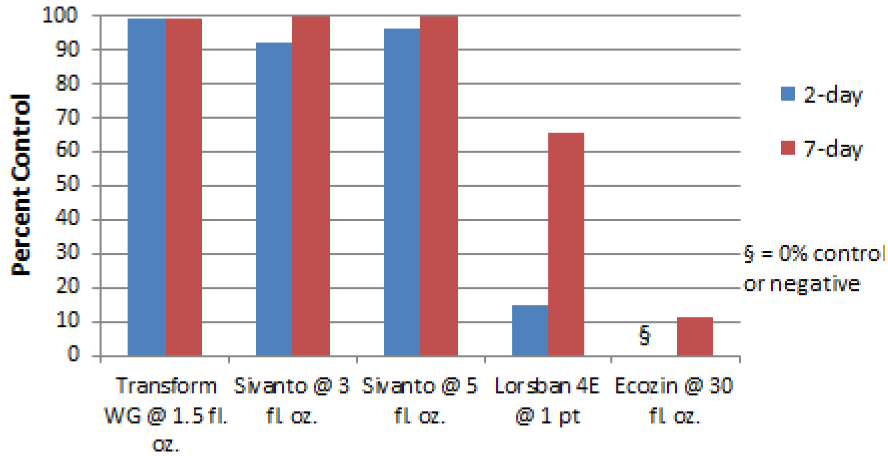


Figure 6. Insecticide Control of Sugarcane Aphid Control on Grain Sorghum, Henry County, GA 2014, treatments applied September 25, 2014 at heading / anthesis.

Table 1. Efficacy of selected insecticides for sugarcane aphid on grain sorghum, Calhoun County TX, PI: Stephen Biles, Texas A&M AgriLife Extension Service.

Treatment (Brand Name)	Treatment (Common name)	Rate (amount per acre)	Sugarcane aphids per leaf§			
			Pretreatment 0 days after application	3 days after application	6 days after application	13 days after application
Transform WG	sulfoxaflor	0.75 oz	251 a	80.73 bc	0 b	0.01 a
Transform WG	sulfoxaflor	1.0 oz	291 a	82.53 bc	0 b	0.901 a
Nufos 4E	chlorpyrifos	2 pints	303 a	14.55 c	0 b	0.01 a
Dimethoate 4E	dimethoate	1 pint	235 a	267.83 a	58.33 a	0 a
Endigo	Thiamethoxam + L. cyhalothrin	5 fl. oz.	357 a	155.42 ab	15.25 b	0.12 a
Centric	thiamethoxam	2.5 oz.	277 a	72.29 bc	1.75 b	0.04 a
Sivanto	flupyradifurone	8 fl. oz.	332 a	70.40 bc	0 b	0 a
Untreated check	--	--	327 a	206.91 a	24.63 ab	0.01 a
LSD $_{(0.05)}$			NS	122.17	36.20	NS
F (*P*) values			0.591 0.7556	4.095 0.0056	2.830 0.0305	0.181 0.9865

Means within columns followed by the same letter are not significantly different (LSD, α = 0.05). NS = not significant.

§Average of 10 upper and lower leaves.

Table 2. Efficacy of selected insecticides for sugarcane aphid on grain sorghum, Beaumont TX; Treatments applied on Sept. 23, 2014 at dough stage.
PI: Mo Way, Texas A&M AgriLife Extension Service.

Treatment (Brand Name)	Treatment (Common name)	Rate (amount per acre)	Sugarcane aphids per leaf§				
			Pretreat-ment 0 DAT	3 DAT	6 DAT	13 DAT	16 DAT
Transform WG	sulfoxaflor	0.75 oz	20.7 a	4.8 d	1.7 d	1.1 cd	0.6 bc
Transform WG	sulfoxaflor	1.5 oz	57.8 a	7.9 cd	2.8 d	0.2 d	0 c
Lorsban Advanced	chlorpyrifos	24 fl. oz.	20.6 a	21.2 abc	25.9 ab	15.1 a-d	8.6 bc
Dimethoate 4E	dimethoate	1 pint	40.1 a	16.9 a-d	16.4 abc	16.8 abc	24.8 a
Endigo ZCX	Thiamethoxam + l. cyhalothrin	5 fl. oz.	65.1 a	10.3 bcd	14.4 bcd	1.4 bcd	2.4 bc
Fulfill	pymetrozine	5 oz.	56.4 a	31.2 ab	24.4 abc	24.0 ab	2.2 bc
Centric 40WG	thiamethoxam	2.5 oz.	43.9 a	8.0 cd	6.9 bcd	0.6 cd	0.2 bc
Sivanto	flupyradifurone	5 fl. oz.	39.9 a	2.5 d	10.7 cd	0.4 d	0.7 bc
Untreated check	--	--	67.6 a	43.5 a	46.2 a	36.7 a	10.0 b

Means within columns followed by the same letter are not significantly different (LSD, α = 0.05). NS = not significant.

§Average of 10 leaves at 0 and 3 days after treatment (DAT) and 20- leaves on other dates.

Table 3. Sugarcane aphid control with foliar insecticides on grain sorghum, Calhoun County, TX; PI: Stephen Biles, Texas A&M AgriLife Extension Service.

Texas A&M AgriLife Extension Service

Sugarcane Aphid Control with Foliar Insecticides in Grain Sorghum near Harvest

Trial ID: 14GS08c Location: Calhoun County Trial Year: 2014
Protocol ID: 14GS06 Investigator: Stephen Biles
Project ID: Study Director:
Sponsor Contact:

Description		Flag Leaf	Flag Leaf	Flag Leaf	Flag Leaf	Head	Flag Leaf	Head
Rating Date		7/11/2014	7/14/2014	7/18/2014	7/21/2014	7/21/2014	7/25/2014	7/25/2014
Rating Type		COUINS	COUINS	COUINS	COUINS	COUINS	COUINS	COUINS
Rating Unit		/leaf	/leaf	/leaf	/leaf	/head	/leaf	/head
Number of Subsamples		1	1	1	1	1	10	10
Days After First/Last Applic.		0 0	3 3	7 7	10 10	10 10	14 14	14 14
Trt-Eval Interval		0 DA-A	3 DA-A	7 DA-A	10 DA-A	10 DA-A	14 DA-A	14 DA-A
Number of Decimals		1	1					
Trt Treatment No. Name	Rate Rate Unit	1	2	3	4	5	6	7
1 Transform	0.75 oz/a	383.9 a	11.1 b	9.275 b	24.950 b	2.500 b	25.8 b	2.4 a
2 Centric	2.5 oz/a	276.1 a	3.9 b	0.000 b	0.275 b	0.000 b	0.0 b	0.0 a
3 Endego	5 oz/a	502.8 a	0.7 b	0.525 b	1.350 b	9.000 b	17.7 b	22.0 a
4 Sivanto	8 oz/a	323.7 a	1.6 b	0.000 b	0.000 b	0.025 b	0.5 b	0.0 a
5 Untreated Check		408.5 a	250.2 a	180.223 a	155.955 a	61.318 a	89.1 a	11.9 a
LSD (P=.10)		181.46	96.47	71.8441	85.6620	32.7439	56.49	24.22
Standard Deviation		144.01	76.56	57.0162	67.9822	25.9859	44.83	19.22
CV		37.8	143.13	150.02	186.22	178.37	168.39	264.75
Replicate F		3.494	1.033	1.137	0.551	0.938	0.535	0.907
Replicate Prob(F)		0.0498	0.4128	0.3736	0.6569	0.4524	0.6655	0.4664
Treatment F		1.449	8.266	7.796	3.956	4.126	2.672	0.998
Treatment Prob(F)		0.2777	0.0019	0.0025	0.0284	0.0249	0.0838	0.4459

Rating Type
COUINS = count - insect

Means followed by same letter do not significantly differ (P=.10, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Table 4 . Reported occurrence and severity of infestation of sugarcane aphid on sorghum in Georgia as of September 8, 2014.

8-Sep				Efficacy (Poor/Fair/Good)		
County	Acres	% Infested	% Treated or needs Treated	chlorpyrifos	dimethoate	other
Baker	3000	25	25	fair		pyr. Poor
Calhoun	1200	100	80	poor		
Clay	900	100	95			
Colquitt	800	100	100			
Decatur	4000	100	50			
Early	1250	100	95		poor	
Grady	1500	100	100			
Macon	7000	100	20			
Marion	250	100	100			
Miller	2000	100	95	poor	poor	
Peach	50	100	100			
Pike	10	100	100			
Pulaski	2500	100	0			
Randolph	1000	100	100			
Schley	30	100	100			
Seminole	1000	100	80			
Spalding	5	100	100			
Sumter	600	100	60			
Taylor	200	100	100			
Terrell	300	100	100			
Thomas	1000	100	100			
Tift	500	100	33			
Turner	700	67	0			
Worth	160	100	100			
TOTAL	29,955	91.6	52.35			

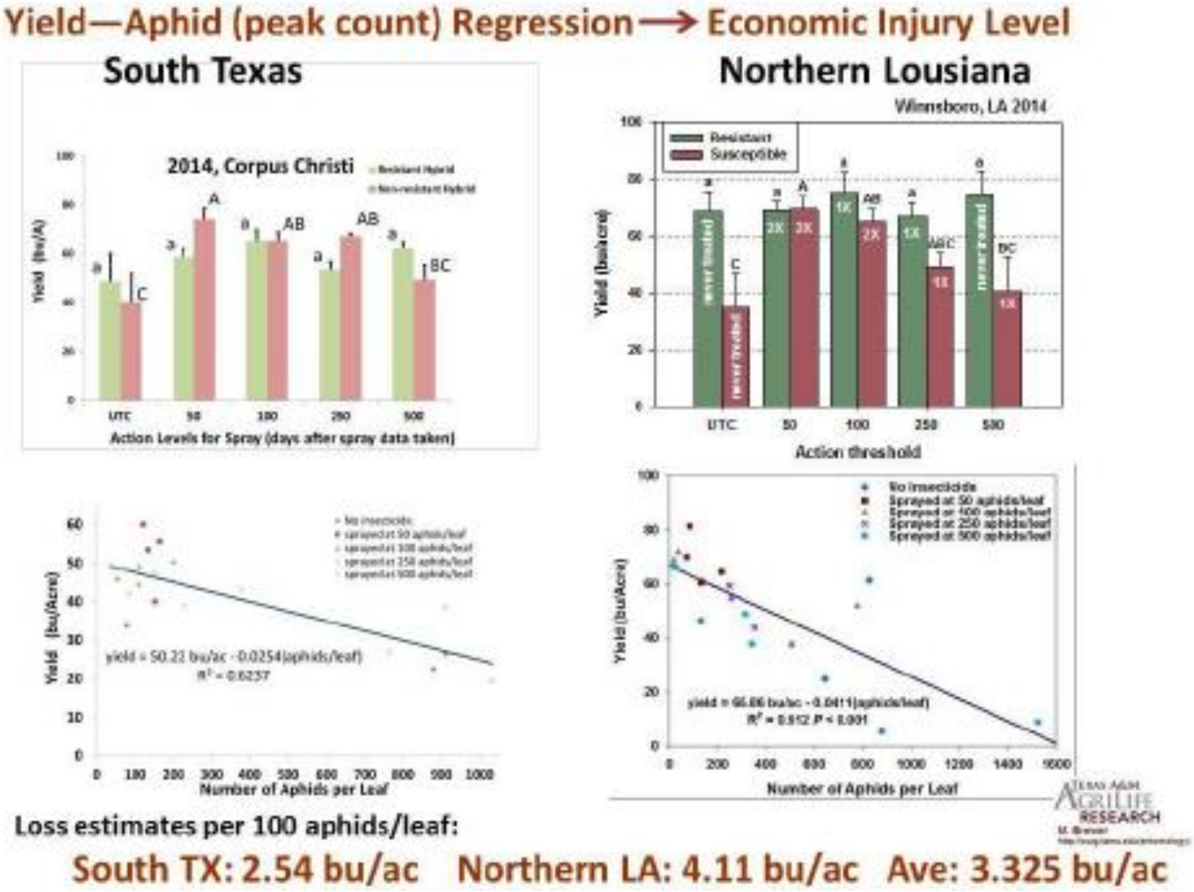


Figure 7. The effect of *Melanaphis sacchari* infestation and feeding injury on yield loss of grain sorghum in trials in southern Texas and northern Louisiana. Treatments represent the number aphids per leaf when insecticide control was done to prevent populations from increasing further.

Florida Department of Agriculture and Consumer Services

Division of Plant Industry

ENTOMOLOGY SPECIMEN REPORT

ADAM H PUTNAM
COMMISSIONER

Section 570.32 (1), F.S.
1911 SW 34th St./P.O. Box 147100, Gainesville, FL 32614-7100/(352) 395-4670/Fax (352) 395-4614

Sample Information

Sample Number E2014-6050-1 — Date Received 8/28/2014

Priority: Routine — Purpose: Academic — Via State/Country

Arthropod Determination

Arthropod Order: HEMIPTERA
Arthropod Family: APHIDIDAE
Arthropod Genus: *Melanaphis*
Arthropod Species: *sacchari*
Arthropod Subspecies:
Arthropod Describer: (Zehntner)
Arthropod Common Name: sugarcane aphid

Determined By: Halbert, Susan — Determination Date: 28-Aug-14
Disposition: 10 - Slide, 200 - Preserve (alcohol)
Life Stage: 210 - ADULT & IMMATURE
Determiners Comments:

I cannot separate these morphologically from the sugarcane aphids we have had for a long time, but there is current molecular research being done to determine if there is a genetic difference. SEH

Confirmed by: — Confirmed Date:

Host Information — Not Verified

Plant Family: Gramineae
Plant Genus: Sorghum
Plant Species:
bicolor (L.) MOENCH

Plant Common Name: SORGHUM, SWEET SORGHUM, SUDAN GRA
Botany Notes:

Plant Part:
Severity:
Collection Method: Hand Catch
Plants Involved/Affected: /
Acres Involved/Affected: /

Non Plant Host Common Name:
Non Plant Host Order:
Non Plant Host Family:
Non Plant Host Genus:
Non Plant Host Species:

Collector/Sender Information

Collection Date: AUG 25 2014
G David Buntin

Sent Date: AUG 26 2014
G David Buntin

Specimen Location Information

Nursery Number:
Business/Individual Address:
Location

Buena Vista,GA
Marion USA

Section - Township - Range:
Latitude: 0 — Longitude: 0

Collector/Sender Comments:

Send Report To:

Gbuntin@uga.edu, S Halbert

Typist: cjc — Completed By: cjc — Date completed: 29-Aug-14